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PROFESSIONAL PAPERS OF THE SIGNAL SERVICE.

No. XIV.

CHARTS OF RELATIVE STORM FREQUENCY

FOR A PORTION OF THE

NORTHERN HEMISPHERE.

*5960.55.14

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

BY

JOHN P. FINLEY,
SERGEANT, SIGNAL CORPS, U. S. A.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF WAR.

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March 23, 1897.

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INTRODUCTION.

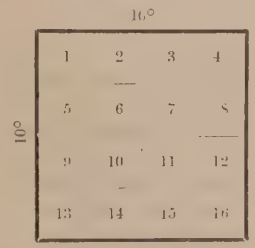
This memoir presents a series of charts illustrating, by colored areas, the monthly and annual distribution of tracks of centres of barometric minima over North America, the north Atlantic, and Europe. The work necessarily offers only approximate results, and the combination of a greater number of years will probably change, more or less, the configuration of the areas of relative frequency as now charted. More extensive observations over the same territory might also sensibly affect the results for these same years, but it is hoped that these charts offer a good basis for comparative study, and suggest some important practical considerations.

The sources of information, and the character and extent of the subject matter, are summarized in the accompanying tables, Nos. I. and II. The original data was in general accepted without change or criticism, and may be divided into two classes: first, those in which the tracks of centres of barometric minima are already projected, showing their progressive movement; second, those in which only the locations of areas of barometric minima are indicated by isobaric lines.

For the first class the track projections were copied without alteration, upon blank charts for each month. In the second class the centres of depression were copied upon the monthly charts, and connected by lines representing the courses of the progressive movements of the storm-centre; both these classes of data were then combined to produce the monthly and annual averages. For the first class the authorities were as follows: 1st. Atlas des Tempêtes, par H. Mohn, Directeur de L'Institut Météorologique de Norvege; containing parts of the years 1867 and 1868. 2d. The United States Signal Service Monthly Weather Review, International Daily Bulletin, International Monthly Summary of simultaneous observations, and manuscript charts of tracks prepared by myself for January to October, 1877, inclusive; containing storm-track charts for North America, the north Atlantic and Europe from January, 1877, to October, 1883. 3d. Synchronous Charts of the north Atlantic for August, 1873, by Capt. H. Toynbee, Marine Superintendent, London Meteorological Office, 1880. 4th. Archiv der Deutschen Seewarte, III., Jahrgang, 1880, Ortsveränderungen der Barometrischen Minima; containing charts for the months of January, February, and March, 1878.

For the second class the authorities were the following: 1st. Atlas Des Mouvements Généraux de l'Atmosphére, rédigé par L'Observatoire Impérial de Paris, U. LeVerrier, Directeur; containing daily isobaric charts from June, 1864, to December, 1865, inclusive. 2d. Cartes Synoptique Journaliéres, embrassant L'Europe et le nord de L'Atlantique, construites par N. Hoffmeyer, Capitaine d'Artillerie, Directeur de L'Institut Meteorologique Danois; containing daily charts from September, 1873, to November, 1876, inclusive.

In summarizing the data from the above sources of information, and arranging the material for the preparation of charts of mean frequency, the following plan was pursued: After preparing the successive monthly charts of storm-tracks, one hundred and thirty-four in all, for the fifteen years above enumerated, each ten degree square was subdivided into sixteen 2°.5 squares, as shown in the following diagram and numbered for convenience from one to sixteen.



From the chart for each month the number of storms traversing each 2°.5 square was counted, crediting it with every storm which fairly crossed any portion of its area.

The totals and averages of the whole series were thus determined for each 2°.5 square for each month of the year, and corresponding charts of averages were then prepared. In taking the monthly

means the totals for each 2°.5 square were divided by the number of individual months, giving equal weight to the earlier approximate and the recent complete charts. The averages for each square having been charted, isometric lines were drawn for a common difference of five-tenths.

The mean annual chart was constructed by summing up the numbers for each 2°.5 square, as given on the twelve mean monthly charts, and drawing isometric lines for a common difference of three.

In the selection and use of the data for the preparation of these charts, the principal object sought was the study of Atlantic storm-tracks, but as nearly one-half of the storms which occur enter the Atlantic from North America, and not a few reach Europe, it was considered important to chart storm-tracks for both of these land areas in conjunction with the ocean. This method not only displays relative frequency, as between different portions of the ocean, but also between the ocean and the surrounding land areas, and gives due consideration to every storm in its entirety, from its development to its termination.

In order to secure this mutual relation between the land and ocean areas, it seemed best to combine only those months for which storm-track charts were available, either for one land area and the ocean, or both land areas and the ocean. This plan necessitated the rejection of months for which there was at hand, for any month, storm-track data for only North America or Europe, and has resulted in producing a broken series of years and even broken years.

The storm-track data rejected for causes above stated, is given in the following table:

Date.	Region of country.	Number of storms.	Authority.
March to December, 1866	Europe	*	Bulletin International de l'Observatoire Imperial de Paris.
January to December, 1867	do	*	Do.
January to December, 1868	do	*	Do.
January to December, 1869	do	*	Do.
January to December, 1870	do	*	Do.
December, 1870	United States	5	Signal Service.
June, 1871	do	9	Do.
January to September, 1871	Europe	*	Bulletin International de l'Observatoire Imperial de Paris.
January to December, 1872	do	*	Do.
June, 1872	United States	10	Signal Service.
October, 1872	do	13	Do.
November, 1872	do	24	Do.
December, 1872	do	27	Do.
January, 1873	do	12	Do.
February, 1873	do	10	Do.
March, 1873	do	11	Do.
April, 1873	do	7	Do.
May, 1873	do	10	Do.
June, 1873	do	10	Do.
July, 1873	do	13	Do.
January to December, 1873	Europe	*	Bulletin International de l'Observatoire Imperial de Paris.
January to December, 1874	do	*	Do.
January to December, 1875	do	*	Do.
January to December, 1876	do	*	Do.
December, 1876	United States	15	Signal Service.
January to December, 1877	Europe	*	Bulletin International de l'Observatoire Imperial de Paris.
January to December, 1878	do	*	Do.
January to December, 1879	do	*	Do.
January to December, 1880	do	*	Do.
January to December, 1881	do	*	Do.
September, 1881	United States	7	Signal Service.
October, 1881	do	6	Do.
November, 1881	do	16	Do.
December, 1881	do	10	Do.
January, 1882	do	14	Do.
February, 1882	do	11	Do.
March, 1882	do	10	Do.
April, 1882	do	11	Do.
May, 1882	do	4	Do.
June, 1882	do	9	Do.
July, 1882	do	6	Do.
August, 1882	do	10	Do.
September, 1882	do	4	Do.

* Tracks not projected.

It is believed that this publication will in some degree prove of interest and value to navigators, inasmuch as its charts graphically illustrate the relative frequency of storms over the most frequented portion of the north Atlantic. The present tables and charts are presented without discussion, and simply as a collection of facts made for further study by meteorologists and navigators.

No attempt is made to account for or explain away any of the evident peculiarities of the distribution of storm frequency, since none of them seem to be improbable.

TABLE NO. I.

Date.	Number of storms.	Region traversed by storms.	Number of years.	Total number of storms utilized in compiling charts.
January, 1865	12	North Atlantic and Europe		
January, 1868	3	North Atlantic and Northern Europe		
January, 1874	29	North America, North Atlantic, and Europe		
January, 1875	34	do		
January, 1876	40	do		
January, 1877	23	do	11	268
January, 1878	32	do		
January, 1879	22	do		
January, 1880	21	do		
January, 1881	25	do		
January, 1883	27	United States and North Atlantic		
February, 1865	14	North Atlantic and Europe		
February, 1868	4	North Atlantic and Northern Europe		
February, 1874	36	North America, North Atlantic, and Europe		
February, 1875	41	do		
February, 1876	39	do		
February, 1877	19	do	11	261
February, 1878	24	do		
February, 1879	21	do		
February, 1880	20	do		
February, 1881	22	do		
February, 1884	21	United States and North Atlantic		
March, 1865	13	North Atlantic and Europe		
March, 1868	2	North Atlantic and Northern Europe		
March, 1874	47	North America, North Atlantic, and Europe		
March, 1875	47	do		
March, 1876	39	do		
March, 1877	25	do	11	299
March, 1878	37	do		
March, 1879	23	do		
March, 1880	24	do		
March, 1881	24	do		
March, 1883	18	United States and North Atlantic		
April, 1865	12	North Atlantic and Europe		
April, 1868	2	North Atlantic and Northern Europe		
April, 1874	48	North America, North Atlantic, and Europe		
April, 1875	47	do		
April, 1876	38	do		
April, 1877	26	do	11	286
April, 1878	20	do		
April, 1879	22	do		
April, 1880	35	do		
April, 1881	21	do		
April, 1883	15	United States and North Atlantic		
May, 1865	12	North Atlantic and Europe		
May, 1874	27	North America, North Atlantic, and Europe		
May, 1875	35	do		
May, 1876	38	do		
May, 1877	25	do	10	234
May, 1878	21	do		
May, 1879	25	do		
May, 1880	18	do		
May, 1881	19	do		
May, 1883	14	United States and North Atlantic		
June, 1864	16	North Atlantic and Europe		
June, 1865	11	do		
June, 1874	44	North America, North Atlantic, and Europe		
June, 1875	34	do		
June, 1876	27	do		
June, 1877	26	do	11	234
June, 1878	16	do		
June, 1879	18	do		
June, 1880	13	do		
June, 1881	18	do		
June, 1883	11	United States and North Atlantic		
July, 1864	13	North Atlantic and Europe		
July, 1865	9	do		
July, 1874	40	North America, North Atlantic, and Europe		
July, 1875	29	do		
July, 1876	25	do		
July, 1877	20	do	11	229
July, 1878	20	do		
July, 1879	15	do		
July, 1880	19	do		
July, 1881	24	do		
July, 1883	15	United States and North Atlantic		

Table No. I.—Continued.

Date.	Number of storms.	Region traversed by storms.	Number of years.	Total number of storms utilized in compiling charts.
August, 1864	14	North Atlantic and Europe	12	266
August, 1865	15	do		
August, 1873	15	North America, North Atlantic, and Northern Europe		
August, 1874	47	North America, North Atlantic, and Europe		
August, 1875	30	do		
August, 1876	30	do		
August, 1877	20	do		
August, 1878	22	do		
August, 1879	15	do		
August, 1880	21	do		
August, 1881	22	do		
August, 1883	15	United States and North Atlantic		
September, 1864	15	North Atlantic and Europe	11	265
September, 1865	13	do		
September, 1873	36	North America, North Atlantic, and Europe		
September, 1874	38	do		
September, 1875	35	do		
September, 1876	32	do		
September, 1877	28	do		
September, 1878	16	do		
September, 1879	17	do		
September, 1880	21	do		
September, 1883	14	United States and North Atlantic		
October, 1864	18	North Atlantic and Europe	12	305
October, 1865	16	do		
October, 1873	43	North America, North Atlantic, and Europe		
October, 1874	39	do		
October, 1875	29	do		
October, 1876	35	do		
October, 1877	25	do		
October, 1878	20	do		
October, 1879	23	do		
October, 1880	26	do		
October, 1882	15	United States and North Atlantic		
October, 1883	16	do		
November, 1864	16	North Atlantic and Europe	12	300
November, 1865	10	do		
November, 1867	3	North Atlantic and Northern Europe		
November, 1873	45	North America, North Atlantic, and Europe		
November, 1874	41	do		
November, 1875	36	do		
November, 1876	42	do		
November, 1877	20	do		
November, 1878	21	do		
November, 1879	26	do		
November, 1880	28	do		
November, 1882	12	United States and North Atlantic		
December, 1864	11	North Atlantic and Europe	11	241
December, 1865	7	do		
December, 1867	5	North Atlantic and Northern Europe		
December, 1873	35	North America, North Atlantic, and Europe		
December, 1874	45	do		
December, 1875	31	do		
December, 1877	15	do		
December, 1878	18	do		
December, 1879	28	do		
December, 1880	32	do		
December, 1882	14	United States and North Atlantic		

TABLE NO. II.

Date.	Storms beginning and ending in North America.	Storms beginning in North America and ending in the north Atlantic.	Storms beginning in North America and crossing the north Atlantic.	Storms beginning and ending in the north Atlantic.	Storms beginning in the north Atlantic and ending in Europe	Storms beginning and ending in Europe.	Storms beginning in North America and crossing the north Atlantic and Europe.	Total number of storms.	Authority.	Number of storms. Highest.	Month.	Lowest.	Month.	Number of months.
June, 1864				3	8	5		16	L					
July, 1864				5	2	6		13	L					
August, 1864				5	3	6		14	L					
September, 1864				6	4	5		15	L	18	October	11	December	7
October, 1864				8	6	4		18	L					
November, 1864				4	6	6		16	L					
December, 1864				3	5	3		11	L					
Sums				34	34	35		103						
January, 1865				3	7	2		12	L					
February, 1865				7	4	3		14	L					
March, 1865				5	5	3		13	L					
April, 1865				4	4	4		12	L					
May, 1865				4	6	2		12	L					
June, 1865				3	4	4		11	L					
July, 1865				4	3	2		9	L	16	October	7	December	12
August, 1865				5	5	5		15	L					
September, 1865				6	2	5		13	L					
October, 1865				2	9	5		16	L					
November, 1865				4	6			10	L					
December, 1865				4	1	2		7	L					
Sums				51	56	37		144						
November, 1867				1	1	1		3	M	5	December	3	November	2
December, 1867				2		3		5	M					
Sums				3	1	4		8						
January, 1868				1		2		3	M					
February, 1868				1	3			4	M	3	January, February	2	March, April	4
March, 1868				1	1			2	M					
April, 1868					1	1		2	M					
Sums				3	5	3		11						
August, 1873	5	5	1		4			15	S. S. and H.					
September, 1873	5	8	2	6	8	6	1	36	S. S. and H.					
October, 1873	10	8	1	7	12	5		43	S. S. and H.	45	November	15	August	5
November, 1873	5	10	3	9	8	10		45	S. S. and H.					
December, 1873	5	6		7	10	7		35	S. S. and H.					
Sums	30	37	7	29	42	28	1	174						
January, 1874	1	7		6	10	5		29	S. S. and H.					
February, 1874	6	6		5	13	6		36	S. S. and H.					
March, 1874	3	9	1	12	9	12	1	47	S. S. and H.					
April, 1874	3	14	1	5	11	13	1	48	S. S. and H.					
May, 1874	4	5	2	1	7	8		27	S. S. and H.					
June, 1874	5	6	2	4	14	12	1	44	S. S. and H.					
July, 1874	6	7	1	3	9	13	1	40	S. S. and H.	48	April	27	May	12
August, 1874	5	14	2	5	13	7		46	S. S. and H.					
September, 1874	8	5	2	8	9	6		38	S. S. and H.					
October, 1874	7	5	4	7	9	5	2	39	S. S. and H.					
November, 1874	5	7	3	12	7	7		41	S. S. and H.					
December, 1874	4	14	3	6	7	10	1	45	S. S. and H.					
Sums	57	99	21	74	128	104	7	480						
January, 1875	5	8	1	5	9	5	1	34	S. S. and H.					
February, 1875	8	11	2	9	5	6		41	S. S. and H.					
March, 1875	3	10	3	13	4	14		47	S. S. and H.					
April, 1875	6	4	1	9	14	12	1	47	S. S. and H.					
May, 1875	6	6	3	6	9	5		35	S. S. and H.					
June, 1875	4	10	3	4	6	6	1	34	S. S. and H.	47	March, April	29	July, October	12
July, 1875	4	7	1	5	7	5		29	S. S. and H.					
August, 1875	6	3		11	5	5		30	S. S. and H.					
September, 1875	8	4	3	10	2	8		35	S. S. and H.					
October, 1875	4	7	2	6	4	5	1	29	S. S. and H.					
November, 1875	4	10	3	7	7	5		36	S. S. and H.					
December, 1875	6	3		9	8	4	1	31	S. S. and H.					
Sums	64	83	22	94	80	80	5	428						

Table No. II—Continued.

Date.	Storms beginning and ending in North America.	Storms beginning in North America and ending in the north Atlantic.	Storms beginning in North America and crossing the north Atlantic.	Storms beginning and ending in the north Atlantic.	Storms beginning in the north Atlantic and ending in Europe.	Storms beginning and ending in Europe.	Storms beginning in North America and crossing the north Atlantic and Europe.	Total number of storms.	Authority.	Number of storms. Highest.	Month.	Lowest.	Month.	Number of months.
January, 1876	5	6	4	5	11	8	1	40	S. S. and H...					
February, 1876	2	8	4	3	10	11	1	39	S. S. and H...					
March, 1876	4	11	2	5	11	6	.....	39	S. S. and H...					
April, 1876	8	6	3	1	7	11	2	38	S. S. and H...					
May, 1876	6	9	3	4	9	7	.....	38	S. S. and H...					
June, 1876	2	6	.....	5	8	6	.....	27	S. S. and H...	42	November	25	July	11
July, 1876	4	5	1	2	6	6	1	25	S. S. and H...					
August, 1876	3	7	2	4	7	6	1	30	S. S. and H...					
September, 1876	2	6	2	3	7	10	2	32	S. S. and H...					
October, 1876	5	5	2	5	5	12	1	35	S. S. and H...					
November, 1876	7	9	1	5	11	9	.....	42	S. S. and H...					
Sums	48	78	24	42	92	92	9	385						
January, 1877	4	6	5	.....	5	2	1	23	S. S. and F...					
February, 1877	2	5	5	.....	5	1	1	19	S. S. and F...					
March, 1877	4	6	4	2	4	4	1	25	S. S. and F...					
April, 1877	4	7	1	3	6	4	1	26	S. S. and F...					
May, 1877	2	4	1	6	5	6	1	25	S. S. and F..					
June, 1877	4	7	1	1	8	4	1	26	S. S. and F...	28	September	15	December	12
July, 1877	4	4	3	1	5	3	.....	20	S. S. and F...					
August, 1877	6	3	1	1	5	3	1	20	S. S. and F...					
September, 1877	7	8	2	2	5	2	2	28	S. S. and F...					
October, 1877	6	4	2	2	4	3	1	22	S. S. and F...					
November, 1877	6	3	3	2	3	2	1	20	S. S.....					
December, 1877	3	3	3	2	2	2	.....	15	S. S.....					
Sums	52	60	31	22	57	36	11	269						
January, 1878	5	7	3	5	6	5	1	32	S. S. and K...					
February, 1878	4	6	3	3	5	3	.....	24	S. S. and K...					
March, 1878	7	12	3	5	8	2	.....	37	S. S. and K...					
April, 1878	3	.....	4	1	3	8	1	20	S. S.....					
May, 1878	3	6	.....	2	5	4	1	21	S. S.....					
June, 1878	3	4	2	2	2	3	.....	16	S. S.....	37	March	16	June, September	12
July, 1878	2	6	2	3	5	2	.....	20	S. S.....					
August, 1878	5	4	2	3	4	2	2	22	S. S.....					
September, 1878	1	5	2	1	4	3	.....	16	S. S.....					
October, 1878	6	5	.....	3	4	2	.....	20	S. S.....					
November, 1878	3	7	1	2	6	2	.....	21	S. S.....					
December, 1878	3	2	4	1	3	5	.....	18	S. S.....					
Sums	45	64	26	31	55	41	5	267						
January, 1879	1	9	3	1	7	1	.....	22	S. S.....					
February, 1879	4	5	4	.....	4	4	.....	21	S. S.....					
March, 1879	3	7	3	1	7	1	1	23	S. S.....					
April, 1879	6	5	3	1	2	4	1	22	S. S.....					
May, 1879	7	7	2	1	3	5	.....	25	S. S.....					
June, 1879	4	5	1	1	5	2	.....	18	S. S.....	28	December	15	July, August	12
July, 1879	2	6	2	.....	2	1	2	15	S. S.....					
August, 1879	2	5	1	2	2	2	1	15	S. S.....					
September, 1879	4	3	1	2	5	2	.....	17	S. S.....					
October, 1879	2	5	2	3	7	3	1	23	S. S.....					
November, 1879	3	8	2	2	6	3	2	26	S. S.....					
December, 1879	9	8	2	.....	3	3	3	28	S. S.....					
Sums	47	73	26	14	53	31	11	255						
January, 1880	2	8	4	1	5	1	.....	21	S. S.....					
February, 1880	3	6	3	1	3	.....	4	20	S. S.....					
March, 1880	3	11	2	.....	5	3	.....	24	S. S.....					
April, 1880	5	7	2	3	10	7	1	35	S. S.....					
May, 1880	5	3	1	.....	7	2	.....	18	S. S.....					
June, 1880	4	3	2	.....	3	1	.....	13	S. S.....					
July, 1880	4	3	.....	.....	7	5	.....	19	S. S.....	35	April	13	June	12
August, 1880	4	5	1	2	5	4	.....	21	S. S.....					
September, 1880	6	3	4	.....	4	3	1	21	S. S.....					
October, 1880	4	4	.....	1	10	4	3	26	S. S.....					
November, 1880	4	3	1	1	10	7	2	28	S. S.....					
December, 1880	6	4	4	1	9	7	1	32	S. S.....					
Sums	50	60	24	10	78	44	12	278						
January, 1881	5	4	1	2	8	4	1	25	S. S.....					
February, 1881	3	4	1	2	9	2	1	22	S. S.....					
March, 1881	2	7	1	.....	6	8	.....	24	S. S.....					
April, 1881	4	3	3	.....	6	4	1	21	S. S.....					
May, 1881	2	4	.....	2	8	3	.....	19	S. S.....	25	January	18	June	8
June, 1881	1	4	2	1	5	5	.....	18	S. S.....					
July, 1881	2	5	.....	.....	11	4	2	24	S. S.....					
August, 1881	1	4	1	3	8	5	.....	22	S. S.....					
Sums	20	35	9	10	61	35	5	175						

Table No. II—Continued.

Date.	Storms beginning and ending in North America.	Storms beginning in North America and ending in the north Atlantic.	Storms beginning in North America and crossing the North Atlantic.	Storms beginning and ending in the north Atlantic.	Storms beginning in the north Atlantic and ending in Europe.	Storms beginning and ending in Europe.	Storms beginning in North America and crossing the north Atlantic and Europe.	Total number of storms.	Authority.	Number of storms. Highest.	Month.	Lowest.	Month.	Number of months.
October, 1882	8	5		1		1		15	S. S.	15	October	12	November	3
November, 1882	342	4		4	2			12	S. S.					
December, 1882	3	8		3				14	S. S.					
Sums	13	17		8	2	1		41						
January, 1883	3	12		9	3			27	S. S.	27	January	11	June	10
February, 1883	4	6		9	2			21	S. S.					
March, 1883	3	8		5	2			18	S. S.					
April, 1883	2	7		4	2			15	S. S.					
May, 1883	3	6		3	2			14	S. S.					
June, 1883	3	5		2	1			11	S. S.					
July, 1883	2	7		3	3			15	S. S.					
August, 1883	3	5		5	2			15	S. S.					
September, 1883	3	6		3	2			14	S. S.					
October, 1883	5	4		7				16	S. S.					
Sums	31	66		50	19			166						

NOTE.—In the above table the following abbreviations have been used:

L. Le Verrier, Atlas Généraux.

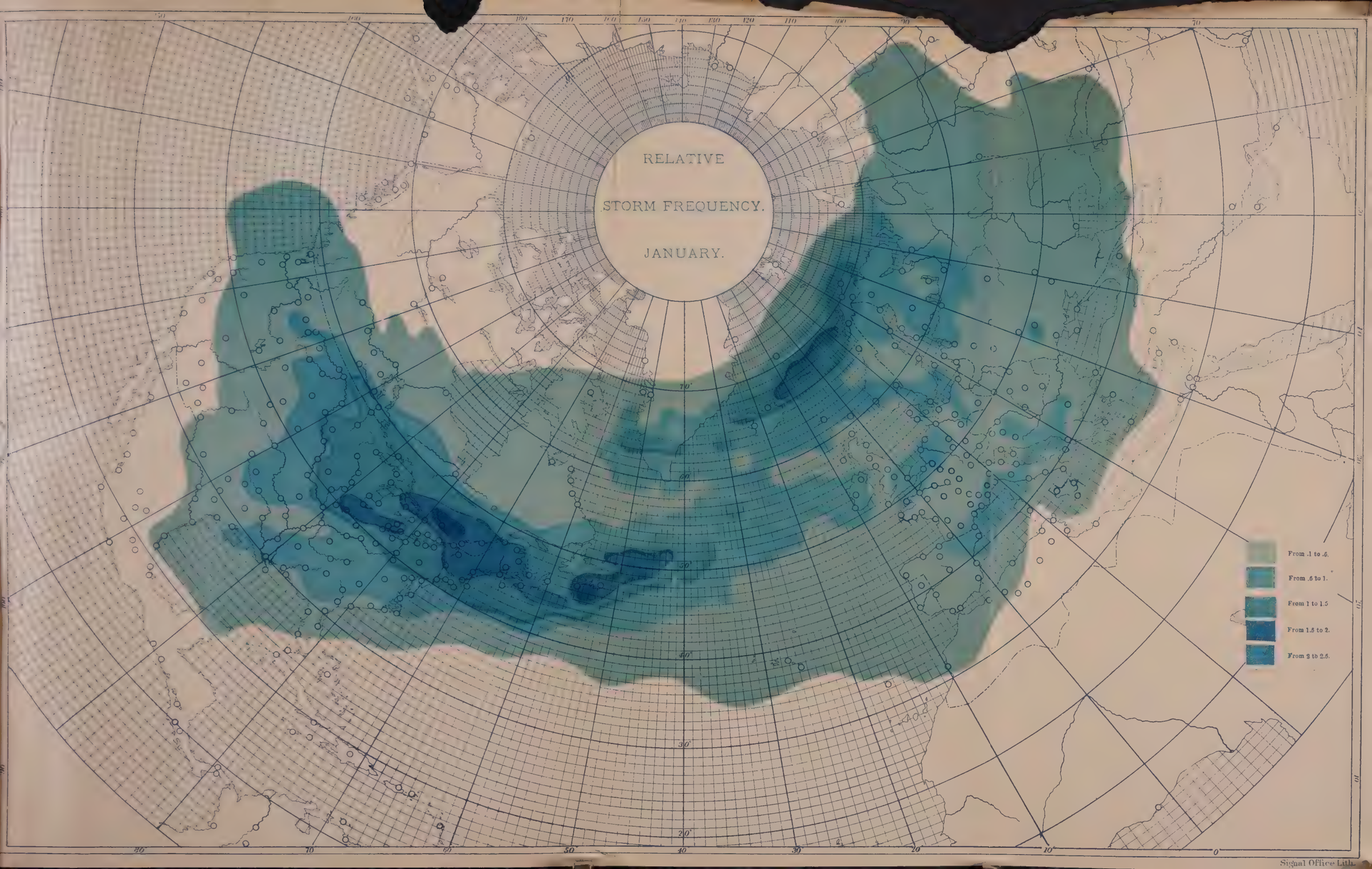
M. Mohn, Storm Atlas.

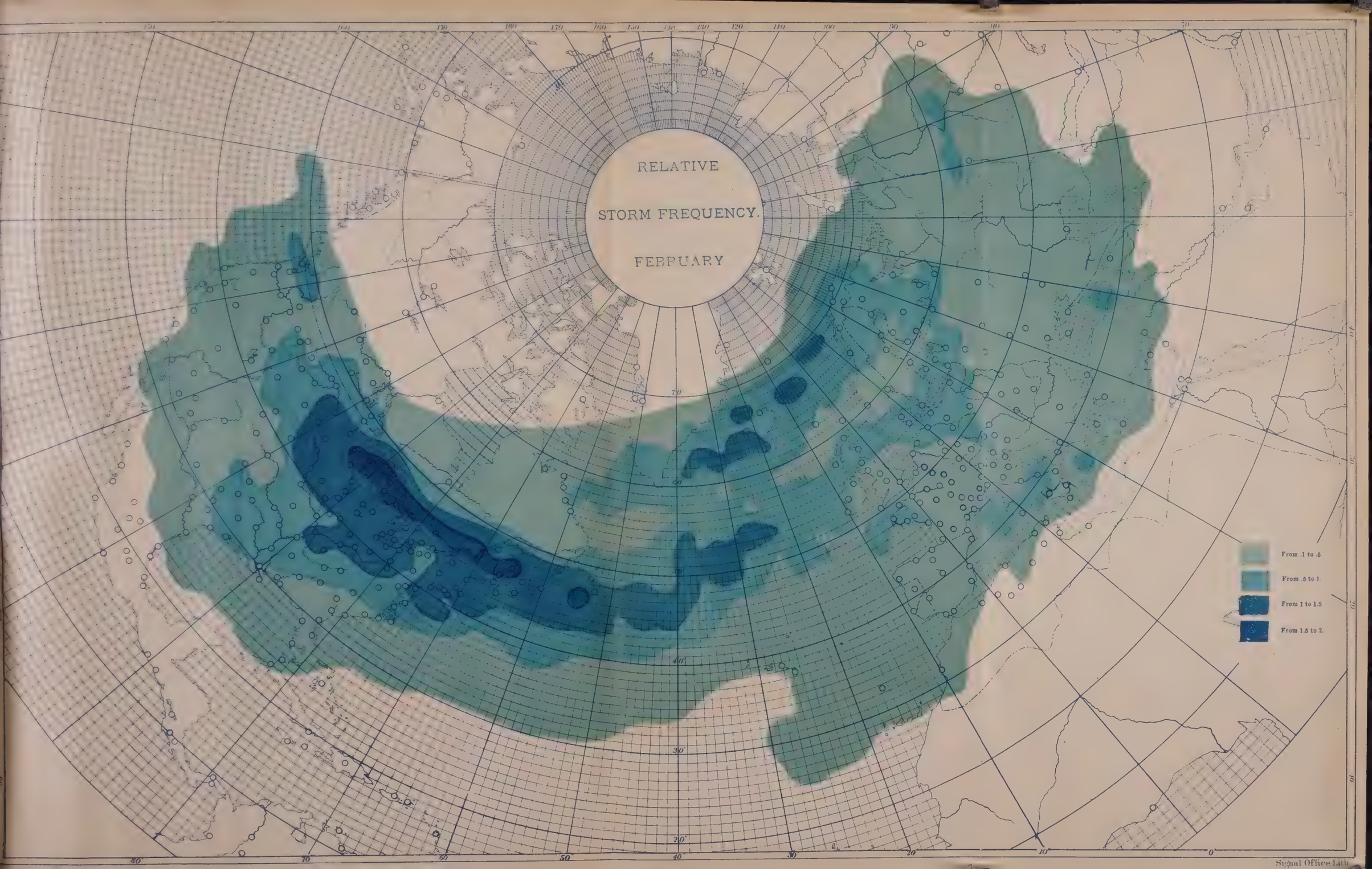
H. Hoffmeyer, Cartes Journaliéres.

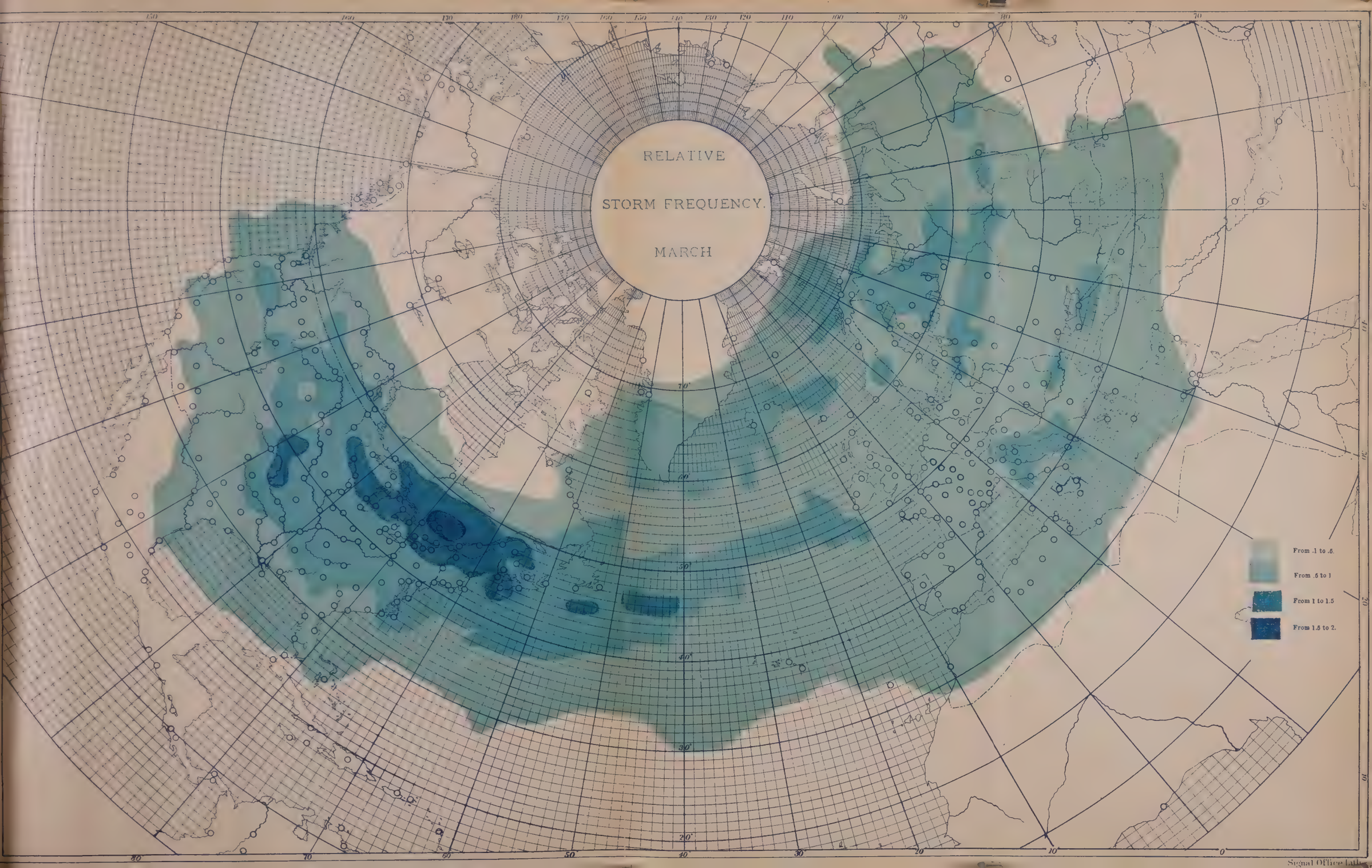
S. S. Signal Service, Monthly Weather Review, International Daily Bulletin, and International Monthly Summary of simultaneous observations.

K. Köppen, Archiv der Deutschen Seewarte.

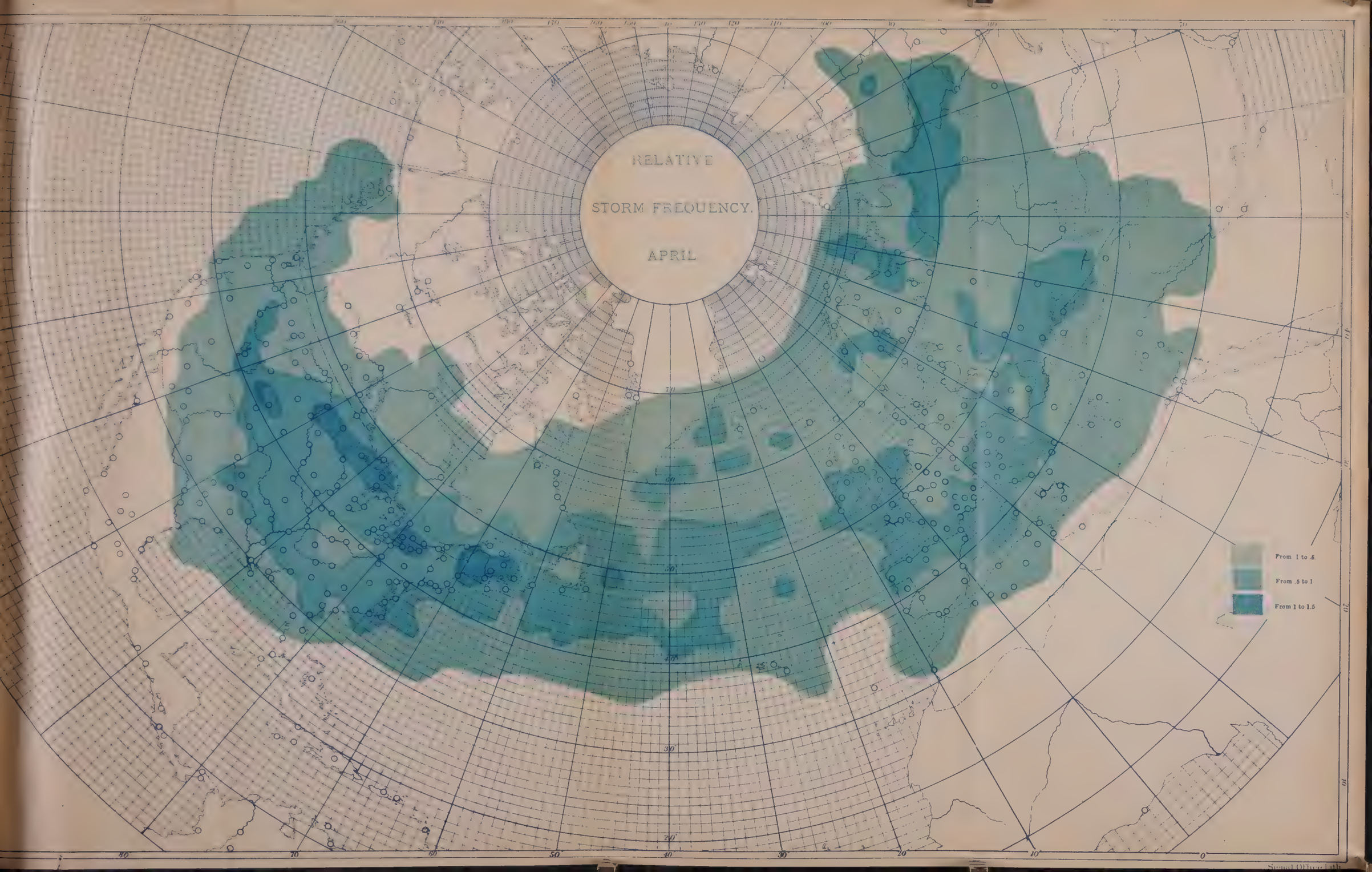
F. Finley, Manuscript Charts on file.

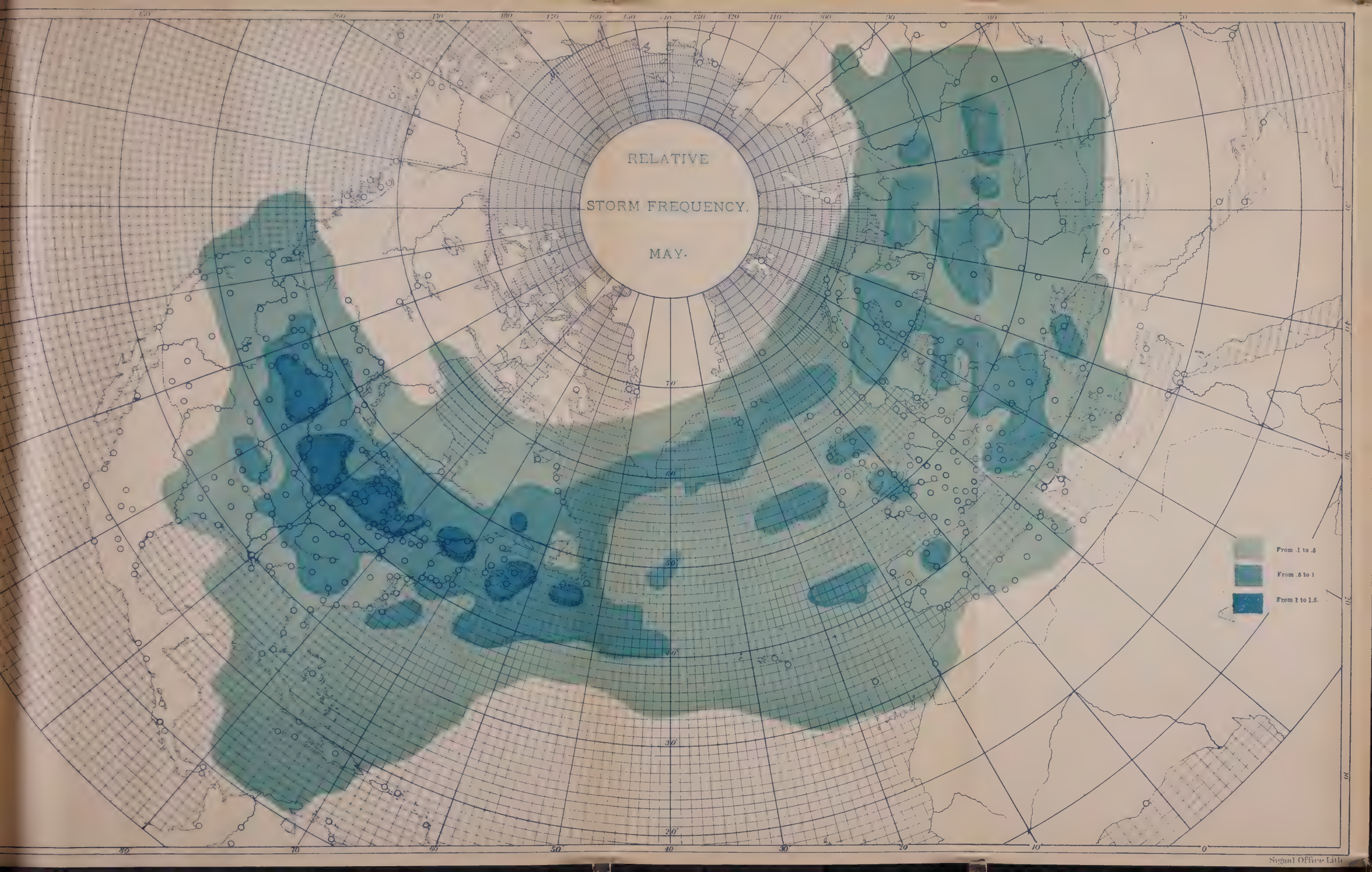

RELATIVE
STORM FREQUENCY.
JANUARY.
From .1 to .5.
From .5 to 1.
From 1 to 1.5
From 1.5 to 2.
From 2 to 2.5.
Signal Office Lith.

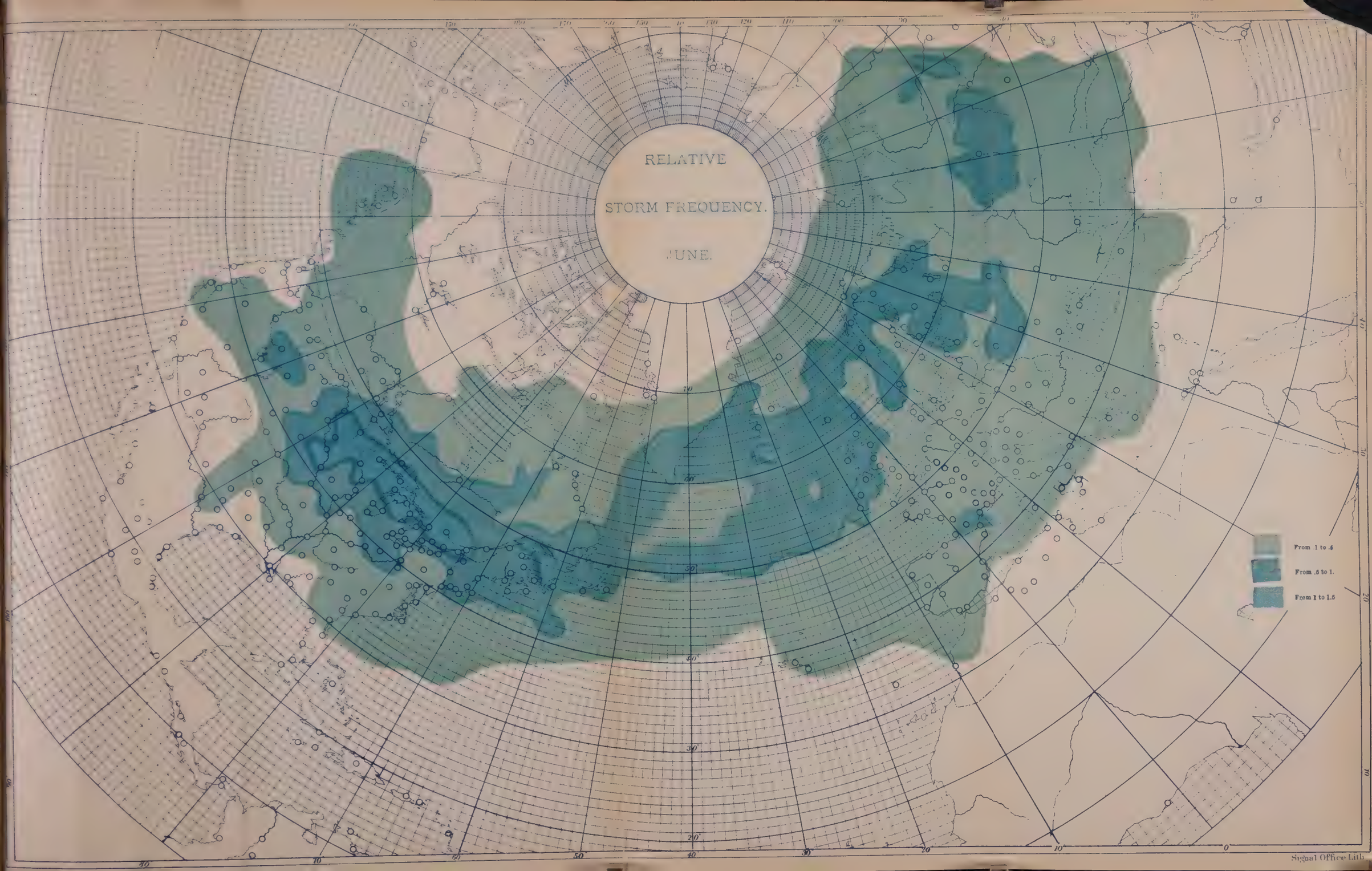

RELATIVE
STORM FREQUENCY.
FEBRUARY
From .1 to .5
From .5 to 1.
From 1 to 1.5
From 1.5 to 2.
Signal Office Lith.

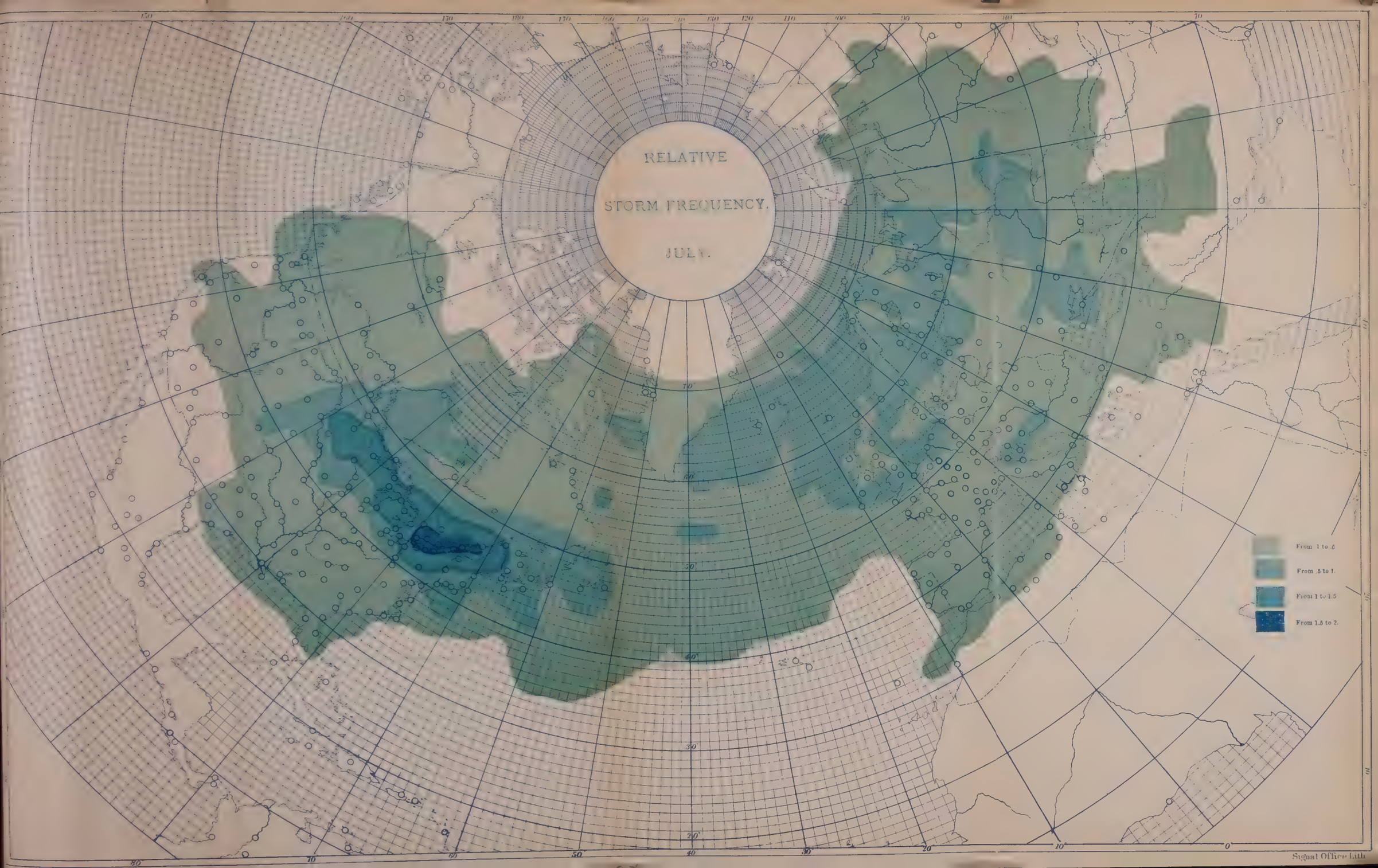


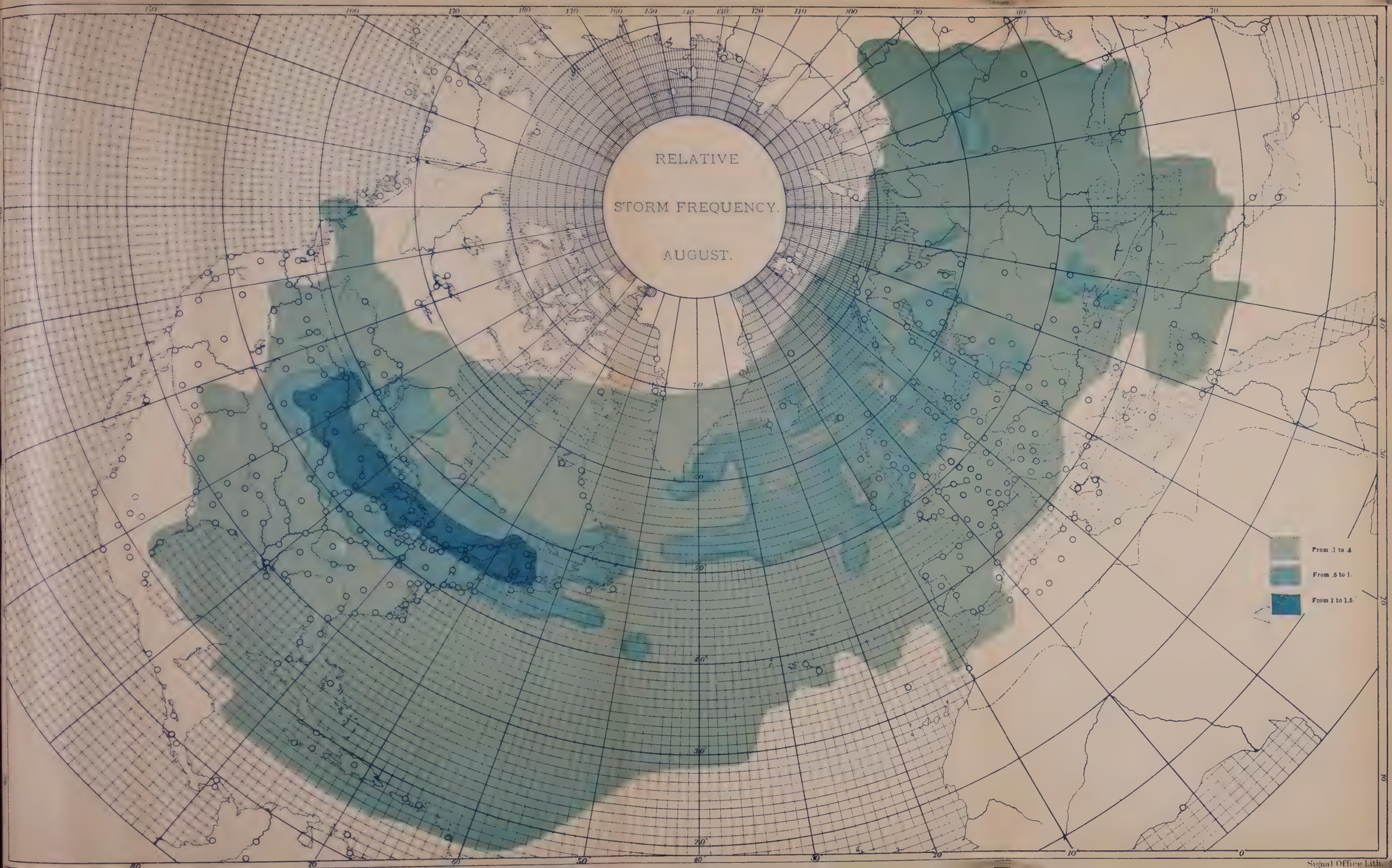
Signal Office Atlas

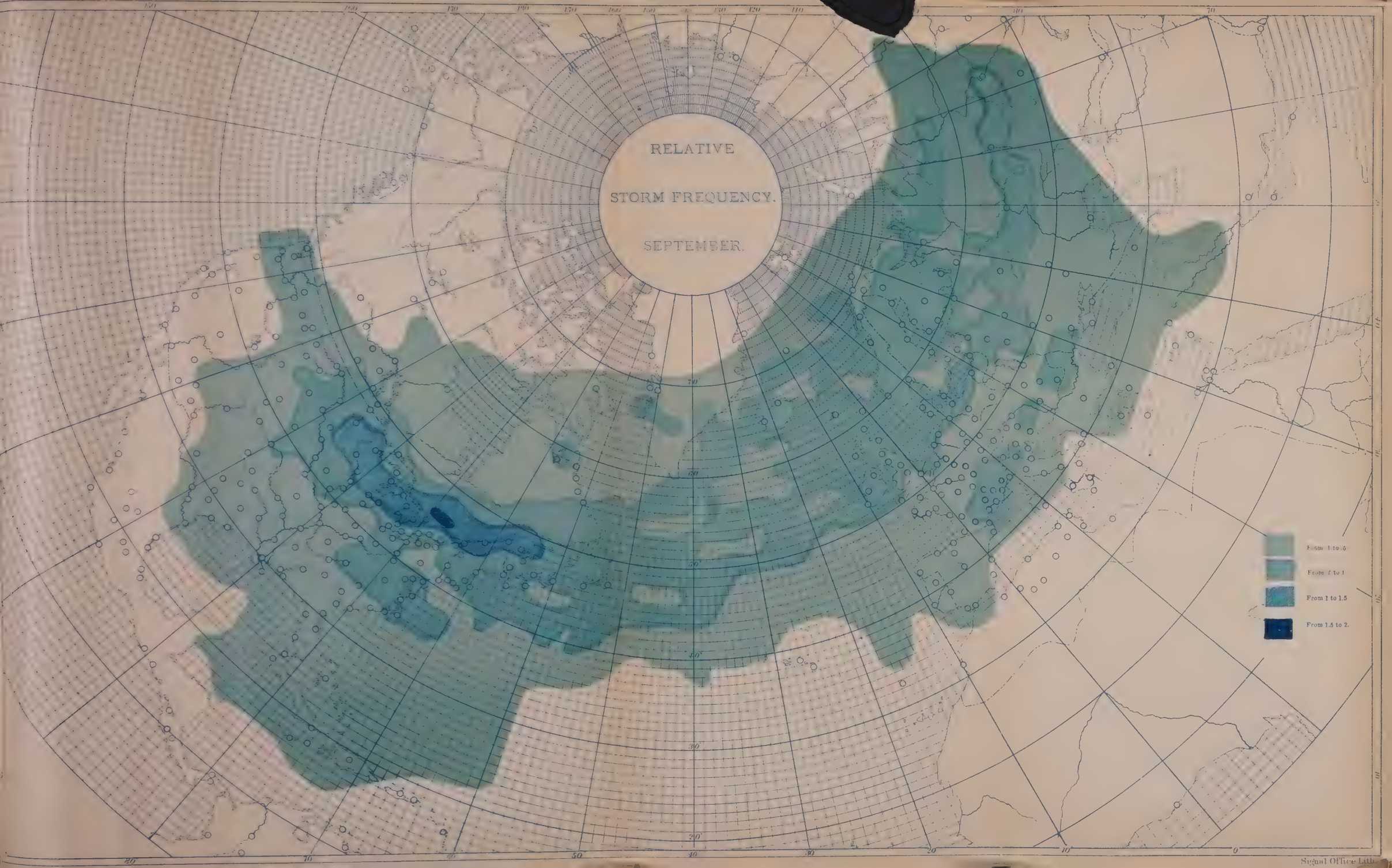

RELATIVE
STORM FREQUENCY.
APRIL
From 1 to .5
From .5 to 1
From 1 to 1.5

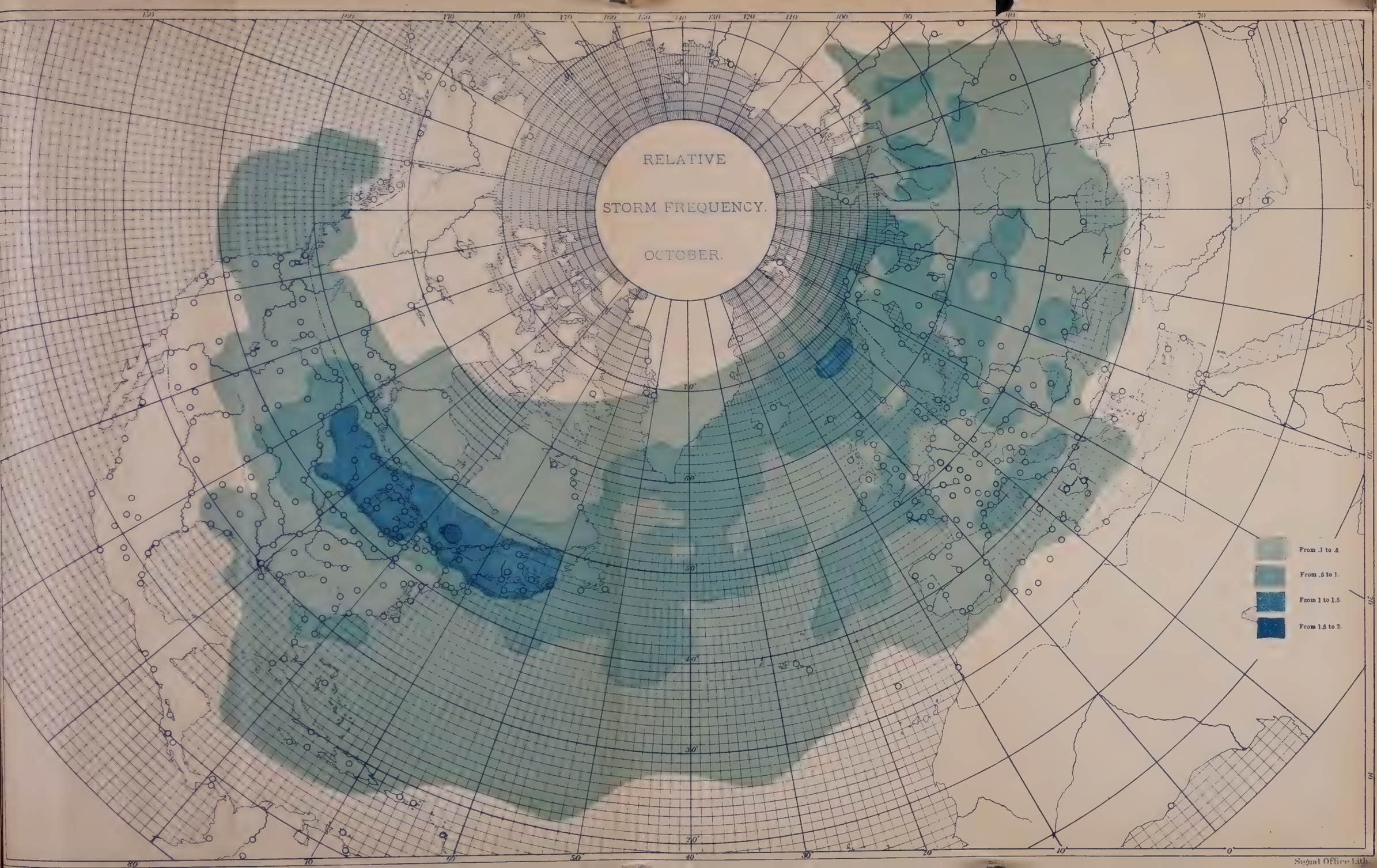

RELATIVE
STORM FREQUENCY.
MAY.
From .1 to .5
From .5 to 1
From 1 to 1.5.
Signal Office Litho


RELATIVE
STORM FREQUENCY.
JUNE.
From .1 to .4
From .4 to 1.
From 1 to 1.6
Signal Office Lith.

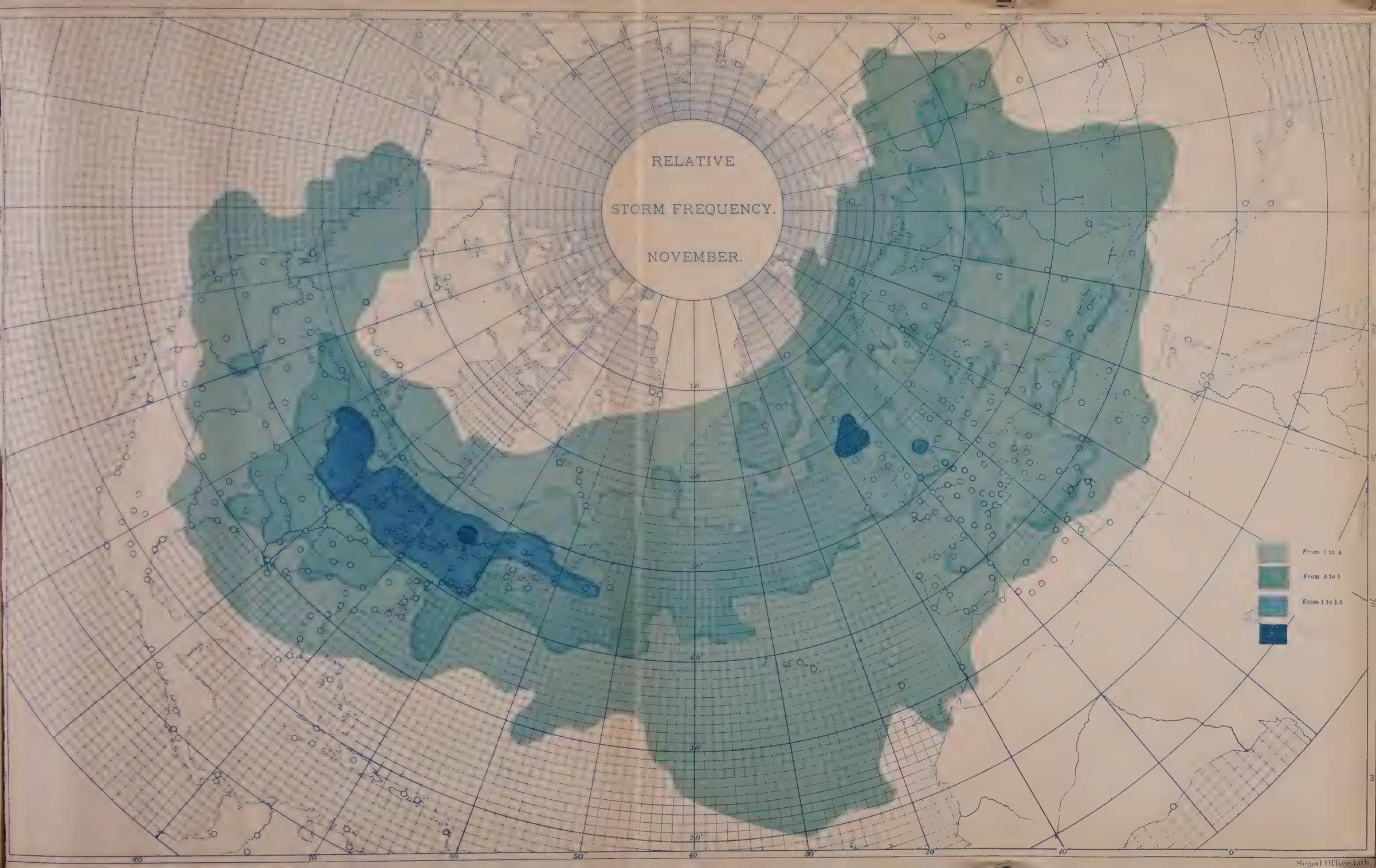

RELATIVE
STORM FREQUENCY.
JULY.
From 1 to .6
From .5 to 1.
From 1 to 1.5
From 1.5 to 2.
Signal Office Lith.

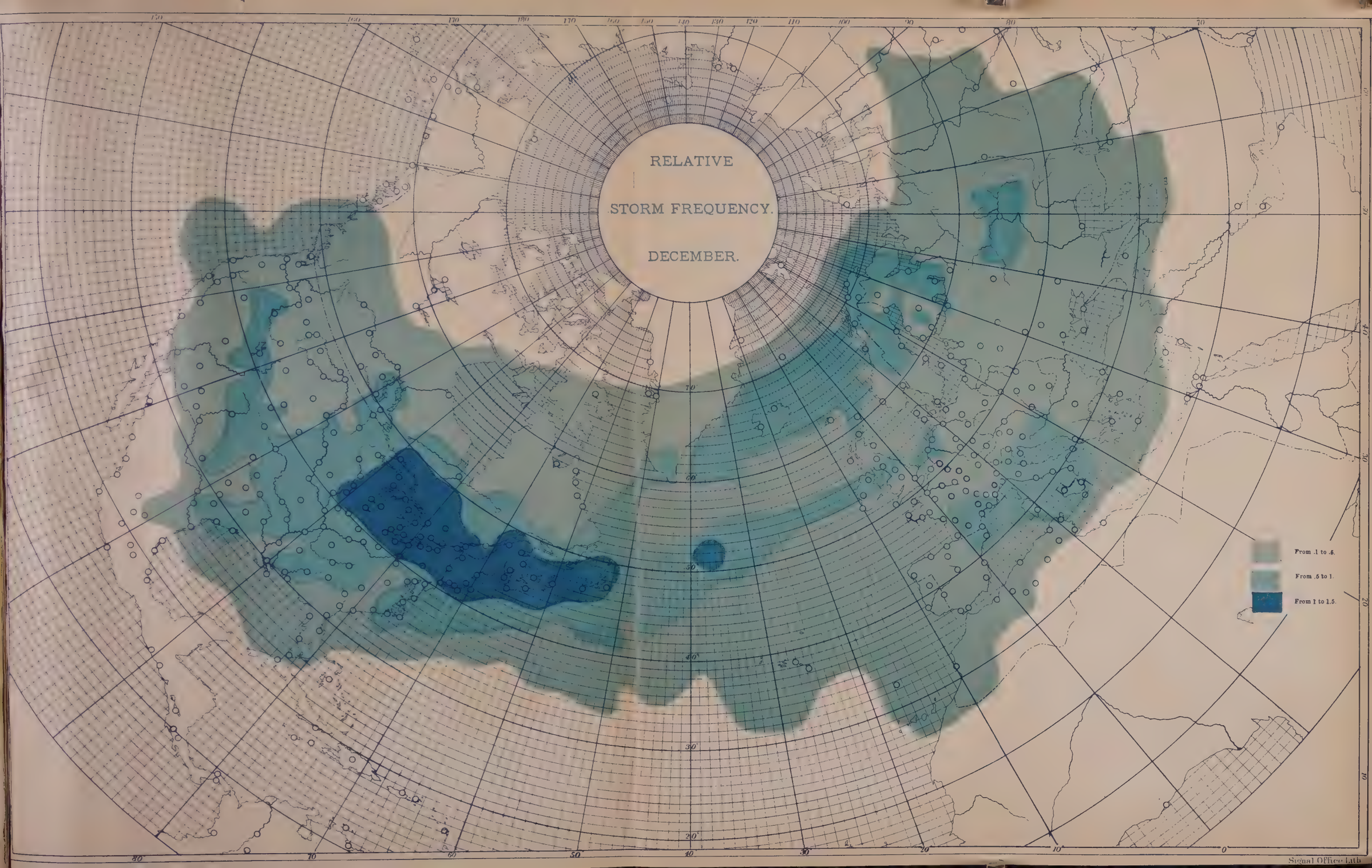

RELATIVE
STORM FREQUENCY.
AUGUST.
From .1 to .5.
From .5 to 1.
From 1 to 1.5.
Signal Office Lith.

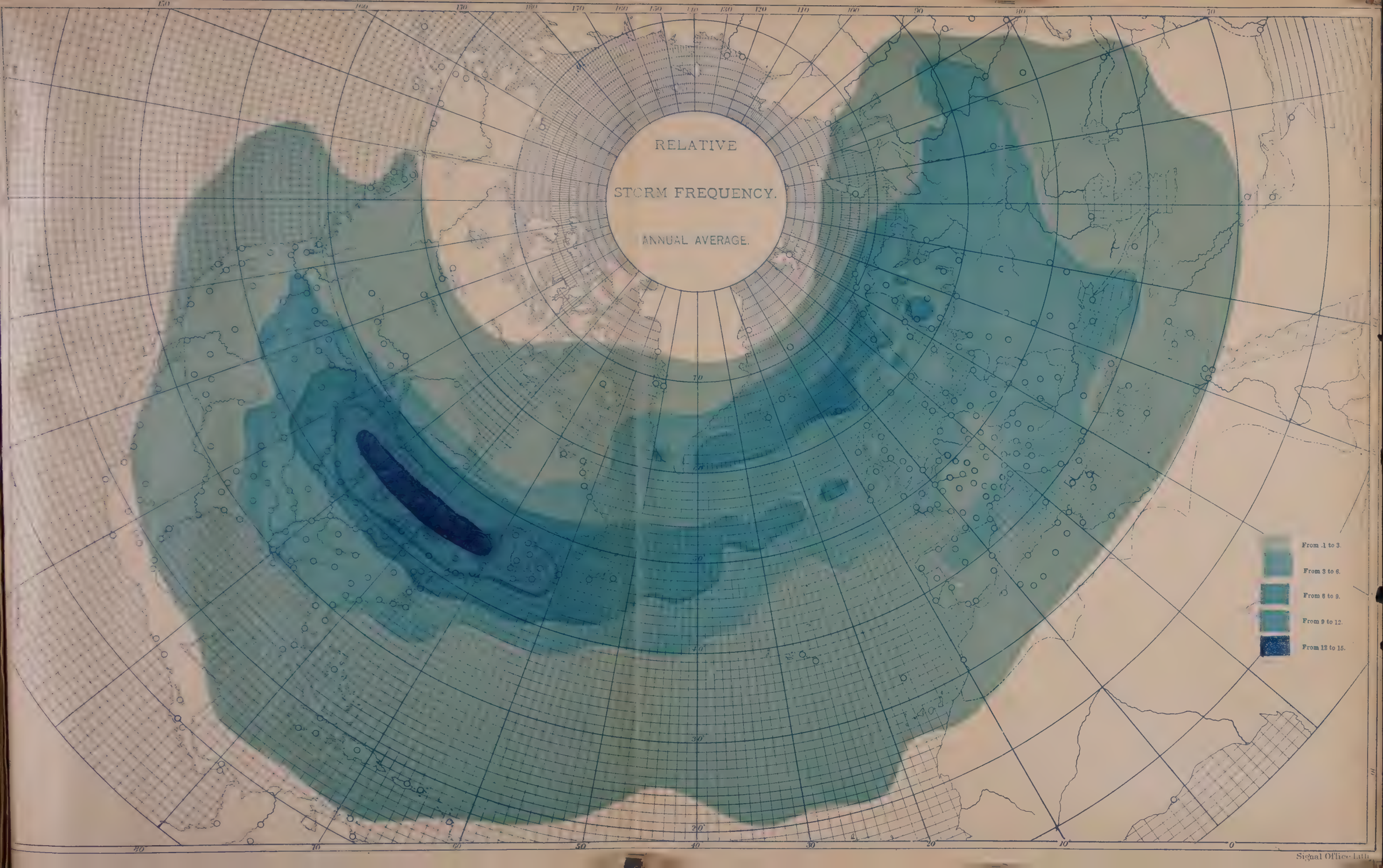

RELATIVE
STORM FREQUENCY.
SEPTEMBER.
From 1 to .6
From .6 to 1
From 1 to 1.5
From 1.5 to 2.
Signal Office Lith.



Signal Office Lith.


RELATIVE
STORM FREQUENCY.
NOVEMBER.
From 1 to 6
From .5 to 1
From 1 to 1.5
Signal Office Lith


RELATIVE
STORM FREQUENCY.
DECEMBER.
From .1 to .5.
From .5 to 1.
From 1 to 1.5.
Signal Office Lith


RELATIVE
STORM FREQUENCY.
ANNUAL AVERAGE.
From .1 to 3.
From 3 to 6.
From 6 to 9.
From 9 to 12.
From 12 to 15.
Signal Office Lith.

B.P.L. Bindery,
DEC 22 1898